THE PSYCHOLOGIC FACTOR IN ENURESIS *

By D. H. GIBBS, M. D., Los Angeles

The frequency with which we are consulted about bed-wetting caused me to review the literature that has been published on enuresis during the past ten years. The physiology of the mechanism of urination is not entirely understood. The work of Young, Cecil, Davis, Wesson, Stewart, Griffiths, Langley, Anderson, Mosso and Pellicani, Goltz and Ewald, Englisch, and others has done much to clarify this question. The spinal center of micturition in the conus terminalis is brought into relationship with the bladder by two sets of nerves: The hypogastric nerves, passing by way of the second and third lumbar nerves, and the inferior mesenteric ganglion to the vesical plexus, and the pelvic visceral nerves which pass through the third and fourth sacral roots to the vesical plexus direct. In adults the desire to urinate arises from stimulation of the sensory nerve-endings in the bladder wall, and in children under 2 years of age this stimulation sets up rhythmic contractions of the detrussor muscle associated with inhibition of the sphincters, resulting in a reflex emptying of the bladder uninfluenced by the will. At about this time the higher centers of micturition, which Stewart locates in the corpus striatum, the optic thalamus and the motor cortex begin to assert their hold on the spinal center, and the child gains control of micturition during the day.

By the end of the third year, control of the spinal center passes to the sphere of the higher centers, and becomes a habit, completing the education of the bladder. For a matter of discussion, I have considered that, in general, if a child habitually wets the bed after three years of age it may be said to be the subject of enuresis. Enuresis in children appears mostly at night. More rarely it may be present day and night. This emptying is involuntary and is accomplished without rousing consciousness.

Weitz believes that, normally, the contraction state of the sphincters is strengthened, partly reflexly and partly voluntarily, by the irritation produced on the brain by the contraction-feeling of the bladder, transmitted by way of the spinal cord. The absence or reduction of this irritation or interference with its transmission to the brain causes micturition to take place more easily. The irritation may be strong enough to be completely felt during the day, but so slight, or even absent during deep sleep, as to permit the unconscious emptying of the bladder. He, therefore, ascribes the absence or reduction of the contraction-feeling of the bladder as the pathogenetic cause of enuresis.

Sunden believes that consciousness is primarily at fault, and that dulling of the cerebral perception is the cause of enuresis. This may be developmental and associated with backward mentality, or due to profound sleep owing to the child being overtired mentally and physically, or to deficient oxygenation of the cerebral centers resulting from posture of the child, arrangements of blankets, or enlarged tonsils and adenoids.

Turner thought enuresis was due to a lack of development of the nerve center that controls the bladder, because it always appeared in young children. Grover and Fulton believe that enuresis is a definite symptom complex of disturbed reflex, which is the result of a general chronic neuro-muscular fatigue due to mental strain, lack of sufficient hours of rest and sleep, excessive muscular exertion and poor diet. This hypothesis is based on a study of over 200 cases, all of which were exceedingly active and nervous, had irregular sleeping hours, and were poorly nourished.

Walker believes that enuresis is due to the arrest of the education and discipline of the bladder. Nobel, because of his results in withholding water and foods of high water content; Nieman, by demonstrating that a potato and bread diet is rich in potash, which causes increased nocturnal output of urine; and Rietschel from his results obtained by dietetic treatment based upon his experiences with the war diet—rich in water, common salts, and carbohydrates—believe that diet plays an important part in the causation of enuresis.

Cameron assumes neurosis to be the cause, being produced by the sense of shame and mental distress involved. Klotz, studying the family history, lays the cause to a neuro-psychopathic constitution. Theimich, supported by the Breslau school, considers enuresis entirely a manifestation of hysteria. Williams, observing aggravation of symptoms following removal of tonsils and adenoids with rapid improvement upon giving thyroid extract; Hertoghe and Liopold Levi, upon observing good results after administering thyroid extract in certain cases, believe that thyroid insufficiency is a potent factor in the production of enuresis.

Van der Bogert believes that chronic gastro-intestinal disturbances play an important role in the production of enuresis, and bases his belief on the study of his series of cases in which enuresis occurs at the age when gastro-intestinal disorders and gross errors in diet are common. Redway, because of the close association of the optic and micturition centers in the brain and the results of six cases treated, believes that some, if not all, cases of enuresis can be traced to errors of refraction.

Abst, Schwartz, Saxl, and Kurzweil give elaborate etiological classifications. Grover, in the study of 200 cases, gives the following interesting facts: Fifty-six per cent gave a family history of enuresis; 79 per cent had been present from babyhood; 36 per cent had had their tonsils and adenoids removed; 51 per cent of the boys had been circumcized; and 20 per cent gave a history of pinworms. Schwartz gives practically the same percentage in 226 cases. Enuresis is then not a disease, but may be simply the persistence of an infantile condition or habit due to a lack of the restraining influence of the higher centers upon the micturition center in the spinal cord.

PROGNOSIS

The vast majority of cases recover; some earlier, some later, control being eventually established. The experience of the recent war showed a larger num-

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ber of adult males suffering from enuresis than was previously supposed.

TREATMENT

The therapy of enuresis is far more hopeful than it was formerly considered, for, as a matter of fact, with the right psychic influence and by the means of a number of recommended methods of procedure, it is possible to cure the vast majority of bed-wetters. At no time are reproaches of value. It is most imperative to gain the child's confidence and co-operation. Assurances of his cure are of therapeutic value. Nesnera reports very good results in treating his enuretic soldiers by suggestion alone.

Before making a diagnosis of essential enuresis, and outlining the treatment, it is imperative that the following causes of incontinence be excluded:

1. Congenital anatomical defects: Spina bifida occulta, malformations of the genito-urinary tract, such as hypospadias, epispadias, etc.

2. Gross surgical lesions; calculus of the kidney or bladder; tuberculosis, and all inflammatory conditions of the genito-urinary tract—vesico-vaginal fistula, etc.

3. General diseases, such as anemia, malnutrition, neurogenic diseases, diabetes, spinal cord lesions, etc.

In order to establish a cure and guard against a relapse, no matter what method of treatment is used, it is important to remove all sources of irritation, as phimosis, adherent clitoris, pinworms, masturbation, tonsils, adenoids, etc., and restrict all liquids and foods of high water content, insofar as possible, during the second half of the day.

The following methods of procedure, which have been highly recommended from time to time as cures for enuresis, will be briefly outlined; but whether they owe their efficacy entirely to their therapeutic value, or to their psychological effect is an open question. Practically all of the present-day writers believe that the success obtained with any method of treatment is due in a large part to its psychic influence.

In 1901, Cathelin's epidural method was first published and was immediately translated into many languages, and a flood of supporting publications followed. Today we know that epidural injections possess therapeutic value, though not absolutely dependable as a cure for enuresis. The best results are reported from a small series of selected cases by Sicard and Freeman. The technique is as follows: With the patient lying on one side in extreme flexion, pierce the obturator membrane through the hiatus formed by the sacral spinal prominence and its two lateral tubercles above, and the cornu of the coccyx below. Inject 5 to 20 cc. of a one-half of 1 per cent novocaine or a physiological salt solution at weekly intervals. Occasionally, six or seven injections are used. Keep the child in bed twenty-four hours with the foot of the bed elevated twelve inches.

The rationale of the method is based upon the epidural pressure effect upon the cerebro-spinal fluid, the direct pressure effect upon the filaments of the cauda equina and the reflex tonic effect upon the lumbar center. Certain modifications of the epidural injections have been recommended as effective. The perineal injections of Cahier, Jaboulay's injection of normal saline between the coccyx and rectum, and simple spinal puncture, withdrawing 10 cc. of spinal fluid and injecting 12 cc. of normal saline solution. The success of these modifications has led some writers, notably Zappert and Rietschel, to draw the conclusion that epidural injection is a well-conceived, easily executed, and very impressive suggestion procedure.

Electricity is employed in many ways, making use of the galvanic, faradic or high frequency current. The negative electrode may be placed against the perineum, in the rectum, or by means of an insulated sound with an olive-shaped metal end directly against the membranous urethra. The indifferent electrode is placed against the lower part of the abdomen. The faradic current in perceptible but not painful intensity, about ten milliamperes, applied for three to ten minutes, repeated every three or four days, is most frequently used and should show results within one month. Von Buben has recently reported rapid improvement following treatment with thermo-penetration, which is a resistance heat generated in the tissue itself by a rapidly alternating current.

Many prominent German urologists and neurologists have assumed a primary underdevelopment or weakness of the internal sphincter as the cause of enuresis, and recommend the strengthening of this muscle by the use of electricity. It is now known that only a small percentage of cases belong to this group. Nevertheless, the results of electrical treatment are striking, especially in older children in which other methods have failed, probably due largely to the profound psychological effect.

Local treatment has been highly recommended by some urologists, but should generally be avoided in younger children. Weitz advised flushing the bladder through a small catheter with silver nitrate solution, beginning with 1/4000, gradually increased to 1/750, twice weekly. Lippman reports 66 per cent of cures in fifty consecutive cases followed up for six months using this method.

Thompson, following the suggestion of Mullins, trains the bladder muscle by passing a moderate-sized catheter and funneling fluid under a pressure of 15 to 150 cc. into the bladder in increasing quantities, removing the catheter, and having the patient void, stopping and starting the stream several times. The quantity used depends upon the size and age of the patient. This treatment aims at dilating the bladder muscle and training the micturition controlling muscles to work more efficiently. Furch, Gross, and Sandek have recently obtained good results with this exercise-therapy of the bladder by having the patient retain the solution as long as possible.

Neave has simplified this method by having the child sit in a chair and hold the urine after having the desire to void. Cantley states that gradual dilatation of the bladder is not necessary or advisable in the majority of cases. The passing of a bougie-a-boule, as used by Emerson, causes an irritation of the posterior urethra and vesical neck, thereby intensifying the sensory impulse to the brain suffi-

ciently to attract the patient's attention by causing pain when the urine passes into the posterior urethra, until the habit of control is established. Abst recommends bi-manual massage, with one finger in the rectum and the palm of the other hand over the symphysis. We have been able to cure one case by gentle massage of the prostate.

The repeated passing of sounds and the cauterization of the bladder-neck have passed into disuse. Walker and many of the German writers believe the results obtained with any local treatment are due to suggestion rather than any local action. Closing the meatus with collodion belongs in the same category. Blum has devised a penis clamp, which can be had in various sizes, and for which he claims good results. Plato recommends the wearing of a urinal, and believes the results are due to the psychic effect and to the effect upon the child's health of a dry bed.

The drug method is probably the oldest and the one most frequently tried first. A great many drugs have been given as specifics for enuresis from time to time. Belladonna is still the favorite, and is given in increasing doses up to 20 minims of the tincture three times a day, under careful supervision to prevent an overdose. Johnson believes that belladonna should be used only to break the habit, and never to be pushed for more than two months. The alkaline treatment, potassium and sodium acetate, sodium bicarbonate etc., is used if urine is highly acid, and acid sodium phosphate if urine is extremely alkaline. Iron is given in anemic cases; bromides in extremely nervous cases (rarely indicated), and thyroid extract, strychnine, and other excitants should be used only in the apathetic atonic class of cases. Mikhailow reports nineteen cases cured following three or four subcutaneous injections of pituetrin given weekly in 1 cc. and 2.5 cc. doses, depending upon the patient's age. Fisher has cured enuresis by giving sulphonal in doses of one grain for each year of the child's life every night for the first week; every other night for the second week, and every third night for the third week. The course is repeated in two or three months if necessary.

Potatzky uses camphor oil, because of its sedative effect upon the irritated conditions of the urinary and sexual organs, its stimulating effect upon the brain thereby combating deep sleep, and its stimulating effect upon the circulatory system. Calcium lactate was added in cases of general reflex over irritability. This brings to mind the possibility of hypo-secretion of the parathyroids. Antipyrin, valerian, potassium bromide, hyoscine hydrobromide, extract of ergot, aromatic fluid extract of rhus, and many others have been given a thorough trial, and for the most part given up.

The dietetic treatment seems better supported and more promising perhaps, and has in recent years been more thoroughly and systematically investigated than any other method. But whether a definite diet can cure enuresis or prevent its appearance is doubtful, and has yet to be proven. Nieman and Rietschel have demonstrated that a potato and bread diet is rich in potash which retards the urine output until night. Nobel has been well satisfied with the therapeutic results obtained by withholding water, not only in liquids, but also in solid foods with high water content. He furnished exact menus of variously concentrated food combinations arranged according to the Nem system. But as there were many relapses, and also because of the great difficulty of indefinitely depriving a child of water, Nobel's work is of more importance experimentally than as a method of cure for enuresis. The experience of the World War was a wholesale experiment of a diet leading to an abundant night discharge of urine rich in salts, and only such persons became bed-wetters in whom there was a local predisposition, or those who were previously enuretic. Diet relations may be a releasing, but not an etiological cause of enuresis.

There are, however, certain foods that should be eliminated from the diet in all cases of enuresis. Tea, coffee, and cocoa, as they are diuretic. Soups, broths, salty and highly seasoned foods are indigestible and diuretic. Bananas and raw apples interfere with the appetite and digestion. Sours and sweets, baked beans, corned beef, frankfurters, etc., should not be permitted. Meats and eggs should not be allowed for supper, and all liquids should be restricted during the afternoon.

Van der Bogert believes gastro-intestinal disturbances play an important part in the production of enuresis, and outlines his treatment accordingly. He goes into detail as to time, quantity, and quality of meals. Redway states that 90 per cent of enuresis is due to reflex irritation, and that some, if not all, are traceable to errors of refraction and can be cured by properly fitted glasses. He also believes that atropine cures enuresis by abolishing eyestrain.

Cold hydrotherapeutic measures help in the general strengthening of the nervous system, but are not to be used indiscriminately. Walker, Sundall, Carter, Cameron, Abst, Hale, Ash, Turner, Dunham, Zappert, Rietschel, and many others believe that the major treatment should be along psychotherapeutic lines, since enuresis is essentially a failure on the part of the higher centers to control and regulate reflex contraction of the bladder. This suggestive treatment can only be employed in older children and in children where there is no lack of mental development. There are various ways in which psychic influence may be employed. Gain the patient's confidence and co-operation, encourage him to believe that he will gain control, tell him that enuresis is a disease and is not shameful or discreditable, and impress upon him that the treatment to be used, whether electricity, injections—local, dietetic, or educational—will produce the desired results. The object is to assist normal development in the associative mechanism of micturition, thus tending to induce a conditional reflex.

Dunham applies suggestion by the presentation of a series of associative visual stimuli. He has printed on a card the following four sentences: (1) I am not going to wet the bed tonight. (2) I am going to wake up at midnight. (3) I shall get up and pass water. (4) I shall not wet the bed any more. The patient repeats these ten times, twice daily, and upon going to bed. The card is then placed under the child's pillow.

Walker employs suggestion during the waking

state, half asleep and half awake, by repeating to the child in simple expressions that the next time he wants to pass urine he will know it and wake up, get out of bed and empty his bladder. Suggestion under hypnotic influence has been employed in refractory cases with good results, but recent articles condemn it because of its unknown influence upon the child's mental development.

Dr. Frank Hamburger says of the various methods of treatment, "I can cure with any of them or without any of them." If he felt that he could not get into sypmathy with his patient he would not treat him, and if he failed once he rarely tried again. Turner has cured 75 per cent of his cases by making an impression upon them.

After the removal of the underlying cause, with its contributing factors, the habit of unconsciously emptying the bladder will usually remain and must be corrected. This is accomplished by placing the child on a so-called enuretic regime. The patient is placed under the best hygienic conditions and on a definite diet, regular meals, no between-meals, no fluids after 4 p. m., etc. Rest is an important item; limit the child's activities after 4 p. m., a mid-day sleeping-period, and in bed at 7 p. m., as it is important to combat the profound sleep. The child voids at definite intervals during the day, and just before going to bed. These intervals during the day are usually lengthened once a week, depending upon the severity of the case. Once during the forenoon and once during the afternoon have the patient, when voiding, stop and start the stream several times. This teaches him voluntary control of the bladder.

The best time to awaken the child at night to voluntarily empty his bladder is a few minutes before the time he habitually wets the bed, which occurs at approximately the same time each night. If this time is not known, he should empty his bladder at 10 p. m., 2 a. m., and 6 p. m. If the bed is found wet at 10 p. m., the child should be awakened one hour after going to bed, etc., the object being to anticipate the involuntary micturition by a voluntary emptying of the bladder. As the treatment progresses, the 2 a. m. awakening may be omitted. The patient should be awakened on the minute. Have him get out of bed, turn on the light, go to the toilet, and, after he is thoroughly awake, voluntarily empty his bladder.

The following conclusions are justifiable: (1) During infancy the micturition reflex is automatic and uninfluenced by the will. (2) Enuresis is the involuntary emptying of the bladder, and does not rouse consciousness to the occurrence of the act. (3) Enuresis may be simply the persistence of an infantile condition or habit due to the lack of the restraining influence of the higher centers upon the micturition center in the spinal cord. (4) Eliminate all anatomical defects, surgical conditions, and general diseases that might cause incontinence before making a diagnosis of enuresis. (5) Remove all irritative conditions, correct the diet, and restrict liquids, to aid in the establishment of a cure and to prevent a relapse. (6) Since enuresis is essentially a failure of the higher centers to control reflex bladder contraction, the major part of the treatment should be directed toward these higher centers. (7) The success of any method of treatment is due, for the most part, to its psychic effect. (8) After removing the underlying cause and its contributing factors, the habit of unconsciously emptying the bladder must be corrected.

In conclusion, I wish to express my appreciation to Dr. Arthur B. Cecil for helpful suggestions in compiling this article.

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DISCUSSION

Miley B. Wesson, M. D. (Flood Building, San Francisco)—Dr. Gibbs' paper is a most interesting and painstaking study, and he demonstrates clearly that the literature of the etiology and cure of enuresis of early life presents an almost hopeless maze of theories, each of which lays stress upon some particular aspect of the subject. Incidentally, none is supported by conclusive scientific evidence. Enuresis is commonly due to a functional irritability of the nervous system, and the literature tends to stress the removal of the local sources of irritation and minimizes the importance of certain general measures. The fact is, the removal of the cause rarely cures except in cases of vesical calculus, because of the habit factor. The establishment of a proper general regime is most important, and particular attention must be paid to early hours, plenty of sleep, avoidance of alcohol, tea, coffee, and sugars, and the removal of all causes of unnatural excitement. Everything possible must be done to improve the general muscular and nervous tone of the individual. Punishments are harmful, rewards valuable, and confidence in the doctor most important.

The passage of sounds, and the giving of bad-tasting medicines are helpful, primarily, because of the mental impression. The only drug of any specific value is belladonna, as it diminishes reflex excitability. My old teacher, Dr. von Pirquet, was very partial to strychnine and atropin, and their routine use, along with afternoon and night restriction of fluids and intelligent systematic training, has proven eminently satisfactory in my hands.

Bed-wetting ceases between the seventh year and puberty, since the cerebral centers develop and are able to control the spinal centers, even during deep sleep. Hence, our efforts are merely to help Nature bring about this result a few years earlier. Dr. Gibbs has shown very clearly that the 117 articles published on this subject in the last decade have added little to our knowledge of the cause and treatment of enuresis.

Robert Lewis Richards (240 Stockton Street, San Francisco)—Dr. Gibbs has given us the most complete account of the physical mechanism of enuresis and various treatments advocated. It is only by assembling all the evidence and judicially weighing the facts concerned that any satisfactory conclusion can be reached. Most of the medical articles give a small sectional view of one man's experience and deductions, but do not review the whole evidence and all the efforts to solve the medical problem in hand. The judicial or legal point of view should be included in medical education so that medical evidence may be more fully presented and weighed. Consequently, such a finished article deserves especial consideration.

I am impressed that the underlying fact in enuresis is the mental fact of little or no responsibility until the brain structures are more complete and the relation of the personality or life pattern to enuresis is clear. "Children under two years are not expected to have full bladder control." By the same token, children at this stage have defective cerebral association or mind function, as shown by Fleshsig's and Brodman's studies of nerve fiber development and cortical architecture. Hence, one would expect not only defective functioning, but also a growing organism capable of more moulding and habit-shaping than a fully developed portion of the human organism. Certainly, the training and habits of bladder

control should be attempted before the stage of walking. With no training, this is left to chance and to rebellion against the discomfort of being wet. Besides, the emptying of the bladder has a pleasurable element, and I have frequently found the pleasurable sensation of "pseudo or early masturbation" associated with emptying the bladder at the same time.

The treatment in each instance mentioned claims nothing specific, but vaguely refers to a mental element, e. g., suggestion and mental impression. Painful impressions, the suggestion of strange impressive procedures, the system of rewards for success, have all been tried and lauded, but there is a strange medical reluctance to more than hints at a possible medical factor. The sick individual is lost sight of, in comparison with his spinal cord centers, sphincter muscles, prostate glands, and foreskin. Certainly, any physical defect has a bearing on the well-being of the individual and his self-control and ability to form proper habits. But it is wise not to deceive ourselves as to the methods of securing results and what we are really striving for. This gives a different point of view and prevents our expecting or promising immediate and complete results. Nocturnal enuresis, after eight years, notoriously accompanies nocturnal epilepsy, in which the convulsive seizure is missed and the wet bed discovered.

The bed-wetting of our military camps was noted to occur in persons with other psychopathic traits. The larger percentage of bed-wetting in that period, as compared with my prior ten years' experience in the regular army, strongly suggested that the stress of war in susceptible individuals had led to a reversion to infantile defects. Besides, the treatment in these cases was less successful in my experience. Hence, I am heartily in sympathy with Dr. Gibbs' attitude as to the mental factors involved in enuresis, and feel that he has kept this often-beclouded issue much clearer.

Clara E. Finney, M. D. (Black Building, Modesto, Calif.)—Dr. Gibbs' paper reminds one of the impractical attitude of many investigators toward enuresis as seen in every-day practice. We should not forget that enuresis is a serious domestic and social problem, rather than a medical one, to a large number of families in a community. True, it is presented to a physician for solution rather than to a sociologist, but few mothers would co-operate, either personally or financially, in the application in most of the methods of cure reviewed by Dr. Gibbs. The excellent point he makes is that, even though there may be underlying causes with contributing factors to be removed, the habit of unconsciously emptying the bladder remains to be corrected; and it is toward the breaking of this habit that the cures for enuresis should be aimed primarily. One has the impression that, of those children brought to the pediatrician, the large majority is suffering from the habit alone; though it was doubtless formed, primarily, from one or more of the many causes enumerated. Dr. Gibbs' paper seems valuable in that, after touching on the many factors, he outlines a practical, efficient regime, and one applicable to the majority of cases.

Asthma Due to Grain Rusts—During recent years, in parts of the northwestern states and Western Canada, rust fungi have attacked a considerable portion of the growing grain. Wheat, barley, oats, and rye in the maturing stage are hosts for special rusts. Wheat rust (Puccinia graminis) is the most prevalent. F. T. Cadham, Winnipeg (Journal A. M. A., July 5, 1924), has seen three patients suffering from asthma, in whom the exciting cause of the attack was a proximity to these rusts. The history of each case is similar: There was a short period of exposure to the infected grain, during which the person was evidently sensitized; then each one left the country or district for a year or more. Asthmatic attacks developed when the patient was once more exposed to rust-infected grain. Each case gave a positive cutaneous reaction to these fungi.

GOITER SURVEY IN UTAH

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PURPOSE OF THE SURVEY

A statewide goiter survey was begun during the present year by the State Board of Health, the survey having been made possible through financial aid from the International Health Board, federal authorities, and the State of Utah. From observations, army draft reports and a number of partial surveys made by the State Board of Health, it was believed that Utah was one of the goitrous areas of the United States. Moreover, it had become known that goiter was one of the easiest diseases to prevent, both as to cost and as to facility of application of preventive measures. As a scientific procedure it was necessary, in as systematic and accurate a manner as possible, to find out just how prevalent goiter was in the state. The survey was necessary, too, not merely that statistics might be collected, but that where prophylaxis was begun it might be known how we started, and later where we ended. In addition to all this, the State Board of Health was convinced that the goiter problem was a public health problem and a matter of serious concern to the state. Their view has recently been expressed by Dr. F. A. Coller of Ann Arbor, when he states "that all goiters are potentially dangerous and most of them do, in fact, eventually produce not only symptoms, but also definite pathologic lesions." They hold that the seriousness of goiter is not to be judged by the amount of disability it causes the child or adolescent (for usually it causes none), but the possible end-results. The survey was, therefore, preliminary to instituting prophylactic treatment which, it is hoped, will within a generation greatly reduce, if not completely remove the goiter blotch from the fair countenance of the State of Utah.

EXTENT OF SURVEY

At the time of the closing of the schools for summer vacation, 69,256 pupils in the schools of the state had been examined, exclusive of the 1945 students at the University of Utah, examined by Dean Porter and associates of the university. The 69,256 pupils represent a school population of 88,108 or 64 per cent of the total school population of the state. The school enrollment is never quite equal to the school population, and an examiner at one visit can practically never get 100 per cent of the enrollment. With all these allowances, there was obtained nearly 80 per cent of the total school population in the areas surveyed.

The area covered included ten counties in which were sixteen school districts. In five of the counties the school district is co-extensive with the county; the other counties are divided into two or more school districts. The counties covered are Cache, Weber (Ogden City), Salt Lake, Utah, Tooele, Emery, Sanpete, San Juan, Grand and Garfield (incomplete). The area of these counties is over 34,000 square miles, or about two-thirds the area of either the state of Illinois or the state of Michigan. So far as the writer knows, Utah has at the present time the most extensive survey for goiter yet made in any state; and on account of the great